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⑪ Publication number:

0 210 629
A2

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EUROPEAN PATENT APPLICATION

⑬ Application number: 86110388.5

⑬ Int. Cl. 4: G11B 27/19

⑭ Date of filing: 28.07.86

⑮ Priority: 29.07.85 JP 167231/85
29.07.85 JP 167232/85

⑯ Date of publication of application:
04.02.87 Bulletin 87/06

⑰ Designated Contracting States:
DE FR GB NL

⑰ Applicant: Kabushiki Kaisha Toshiba
72, Horikawa-cho Saiwa-ku
Kawasaki-shi Kanagawa-ken 210(JP)

⑰ Inventor: Tabe, Kochi c/o Patent Division
KABUSHIKI KAISHA TOSHIBA 1-1 Shibaura
1-chome
Minato-ku Tokyo 105(JP)
Inventor: Saito, Tetsuo c/o Patent Division
KABUSHIKI KAISHA TOSHIBA 1-1 Shibaura
1-chome
Minato-ku Tokyo 105(JP)
Inventor: Ohtomo, Junichi c/o Patent Division
KABUSHIKI KAISHA TOSHIBA 1-1 Shibaura
1-chome
Minato-ku Tokyo 105(JP)

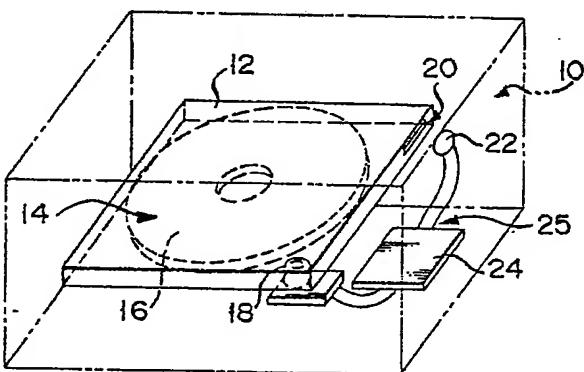
⑰ Representative: Henkel, Feller, Hänsel &
Partner
Möhlstrasse 37
D-8000 München 80(DE)

⑲ An Information-storage medium and an Information-processing apparatus using the same.

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⑲ An information-storage medium, which includes an optical disk (14) having a recording layer (16), comprises bar-code label (20) for indicating the properties of the layer, for external reference. In an information-processing apparatus (10), which comprises optical head (18) and information-processing circuit (24) for at least reproducing information on the layer of the medium (14) stated above, the circuit (24) includes bar-code reader (22) for reading the properties of the layer from the bar-code label (20) so that the circuit can perform at least information reproduction on the layer of the medium, in accordance with the properties of the layer, read by the bar-code reader, whereby information processing can be effected on various information-storage media, whose layers have different properties.

F I G. 1



EP210629

Publication Title:

No title available

Abstract:

Abstract not available for EP0210629

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An information-storage medium and an information-processing apparatus using the same

The present invention relates to an information-storage medium, such as an optical disk having a recording layer, and to an information-processing apparatus using such a storage medium.

The present optical disks can be roughly classified into a reproduction only type, such as a compact disk or a video disk, in which only reproduction is possible, a recording/reproduction type, in which recording and reproduction are only possible, and an erasable type, in which recording, reproduction, and erasure are possible. In any types of optical disks, the information processing (recording, reproduction, and erasure) on the layer is effected by use of a laser beam. In these existing optical disks, the materials for the recording layer can be classified into two main groups, i.e., organic and inorganic films.

Inorganic recording layers include pitted, phase-variation, and bubbled types, while organic ones include pitted and molecular-variation types. In these various types of recording layers, their laser-beam reflection factor varies, depending on their materials and production processes.

Moreover, record signals, recorded on these conventional recording layers, have different polarity. The polarity difference is caused by two cases, in one case laser-beam reflection factor at signal recorded regions on the layer, on which the record signals are recorded, being higher than that at no-signal recorded regions on the layer, on which no signals are recorded, and in another case said factor at signal recorded regions being lower than at no-signal recorded regions.

The threshold power value of the laser beam power source also varies, depending on the type of the recording layer.

For these reasons, the prior art optical disks cannot be used in any information-processing apparatuses other than their own exclusive ones. In other words, each information-processing apparatus can use only an optical disk of a specified type.

The present invention has been contrived in consideration of these circumstances, and is intended to provide an information-storage medium, such as an optical disk adapted for at least information reproduction, having a recording layer, whose properties can be externally identified with ease, so that various types of such information-storage media can be used in a single information-processing apparatus. Another object of the invention is to provide an information-processing apparatus which can use said information-storage medium described above.

The above object of the invention is achieved by an information-storage medium, which includes an optical disk having a recording layer, characterized by comprising, means for indicating the properties of the recording layer, for external reference.

If the information-storage medium has such indicating means, only one information-processing apparatus can be adapted for reproducing information of an optical information storage medium having a recording layer, by making the information-processing apparatus comprises means, provided on the optical information storage medium, for indicating the property of the recording layer; means for reading the property of the recording layer from said indicating means; means for reproducing the information recorded on the recording layer; and means for controlling the operation of said reproducing means in accordance with the property of the recording layer read by said reading means, so that the operation for the reproduction of the information changes in response to the property of the recording layer indicated by said indicating means.

In the information-storage medium of the invention, constructed in this manner, the indicating means may be formed of a magnetic tape on which magnetic signals indicating the properties of the recording layer are recorded, or may be a bar code, signs, or a combination of depressions and projections, each of which indicates the properties of the recording layer.

In said optical disk, a laser beam is used for at least information reproduction. In this case, the properties of the recording layer of the optical disk, indicated by the indicating means, preferably include, at least, the laser-beam reflection factor of the layer, the polarity of the information signals recorded on the layer, or the threshold power value of the power source of laser beams applied to the layer.

According to the invention, moreover, the information-storage medium may be housed in a cassette for protection. In this case, the indicating means can be provided on the cassette.

This invention can be more fully understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a perspective view schematically showing an optical disk, as an information-storage medium according to a first embodiment of the present invention, and an information-processing apparatus using the disk, the disk being housed in

a cassette for protection, and indicating means, indicating the properties of a recording layer of the disk, being provided on the cassette;

Fig. 2 is a schematic view showing a bar code, as a first example of indicating means on the cassette of the optical disk of Fig. 1;

Fig. 3 is a schematic view showing a magnetic tape, as a second example of indicating means;

Fig. 4 is a schematic view showing a label, on which signs are printed, as a third example of indicating means;

Fig. 5 is a schematic view showing a combination of depressions and projections, as a fourth example of indicating means;

Fig. 6 is a perspective view schematically showing a modified example of the position of the indicating means on the optical disk cassette; and

Fig. 7 is a perspective view schematically showing an optical disk, as an information-storage medium according to a second embodiment of the invention, and an information-processing apparatus using the disk, the disk being not housed in a cassette for protection, and indicating means, indicating the properties of a recording layer of the disk, being provided directly on the disk.

In Fig. 1, reference numeral 10 designates an information-processing apparatus according to a first embodiment of the present invention. Planar cassette 12 is removably housed in apparatus 10. Cassette 12 contains optical disk 14, for use as one kind of informationstorage mediums. In this disk 14, recording layer 16, which is adapted for information recording, reproduction, and erasure by use of a laser beam, is formed on a base plate, on which a spiral groove or concentrical grooves is formed in advance. The information is image information, such as characters and drawings. The optical disk of this type is well-known in the art.

Optical head 18 is also mounted in information-processing apparatus 10 to face the lower surface of cassette 12 of optical disk 14. Optical head 18 includes a semiconductor laser as a laser power source, an objective for converging a laser-beam from the semiconductor laser on recording layer 16 of optical disk 14, a reflecting light detector for detecting the reflecting light and converting the reflecting light to electric signals, means for controlling the power of the laser power source, and means for information reproduction in accordance with the electric signals. This type of opti-cal head 18 is well known in the art. Head 18 is movable in the radial direction of optical disk 14. While disk 14 is being rotated in apparatus 10, head 18 moves in the radial direction, thereby effecting recording, reproduction, or erasure of information on recording layer 16 of disk 14, through the medium of the laser beam.

Indicating means 20 is provided on a peripheral surface of cassette 12 of optical disk 14. The indicating means indicated some properties of recording layer 16 of disk 14, for external reference.

5 These properties include the laser-beam reflection factor of layer 16, the polarity of the information signals recorded on layer 16 (based on the level of reflection factor on the recorded region of layer 16 in comparison with that on the unrecorded region of layer 16), the threshold power value of the power source of the laser beam, applied from optical head 18 of information-processing apparatus 10 to layer 16, and other physical constants.

10 Information-processing apparatus 10 further contains property-reading means 22, which serves to read the aforesaid properties indicated by indicating means 20 on cassette 12. The reading means is connected to control part 24, which is formed, for example, of an electric circuit, inside apparatus 10. Optical head 18 is also connected to control part 24. Control part 24 and optical head 18 constitute information-processing means 25.

15 Control part 24 controls the operation of optical head 18, in accordance with the properties of recording layer 16, read from indicating means 20 of cassette 12 by reading means 22. Thus, head 18 can suitably perform information recording, reproduction, or erasure on layer 16. In the control of the operation of optical head 18, changes in power value of the power source of the laser beam and in a conversion process to the electric signals in the reflecting light detector, in accordance with the laser-beam reflection factor in layer 16, the polarity of the information signals recorded on layer 16, the threshold power value of the power source of the laser-beam, and other physical constants, are included.

20 In the information-processing apparatus 10 of the invention, as described in detail above, the operation of optical head 18 is controlled by control part 24 so as to make it possible that optical head 18 records, reproducts, and erases informations on and from recording layer 16 in accordance with the properties of layer 16, the properties being read through reading means 22 from indicating means 20 on cassette 12 of optical disk 14 mounted in information-processing apparatus 10. Therefor, if various optical disks having recording layers of different properties are used in one information-processing apparatus, the information-processing apparatus can record, reproduct, and erase informations on and from any one of the recording layers of various optical disks.

25 It is to be understood that the present invention is not limited to the embodiment described above, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the invention.

For example, indicating means 20 may be formed of bar code 26, as shown in Fig. 2. The bar code 26 may be printed directly on cassette 12 of optical disk 14, or may be printed on a label which is to be pasted on the cassette, thereafter. In this case, reading means 22 of information-processing apparatus 10 must be a bar-code reader.

Alternatively, the indicating means 20 may be formed of magnetic tape 28 on which magnetic signals, indicating the aforesaid properties, are recorded, as shown in Fig. 3. In this case, reading means 22 must be a magnetic-signal reader, such as a magnetic head.

As shown in Fig. 4, moreover, the indicating means 20 may be formed of a combination of signs 30, such as characters and figures. Signs 30 may be printed directly on cassette 12 of optical disk 14, or may be printed on a label which is to be pasted on the cassette, thereafter. In this case, reading means 22 must be a sign discriminator.

As shown in Fig. 5, furthermore, the indicating means 20 may be a combination of depressions 32 and projections 34. In this case, reading means 22 may be an optical irregularity discriminator, or a mechanical one which uses a plurality of feelers.

Further, indicating means 20 may alternatively be located on an upper and/or lower surfaces of cassette 12, as shown in Fig. 6.

As shown in Fig. 7, furthermore, indicating means 20 may be directly provided on optical disk 14.

Recording layer 16 may be a reproduction only type, in which only reproduction is possible, and may be a recording/reproduction type, in which recording and reproduction are only possible.

Claims

1. An information-storage medium, which includes an optical disk (14) having a recording layer (16),

characterized by comprising:

means (20) for indicating the properties of the recording layer, for external reference.

2. The information-storage medium according to claim 1, characterized in that said indicating means (20) includes a magnetic tape (28) on which magnetic signals indicating the properties of the recording layer (16) are recorded.

3. The information-storage medium according to claim 1, characterized in that said indicating means (20) includes a bar code (26) indicating the properties of the recording layer (16).

4. The information-storage medium according to claim 1, characterized in that said indicating means (20) includes signs (30) indicating the properties of the recording layer (16).

5. The information-storage medium according to claim 1, characterized in that said indicating means (20) includes a combination of depressions (32) and projections (34) indicating the properties of the recording layer (16).

6. The information-storage medium according to claim 1, characterized in that a laser beam is used for said information reproduction, and said properties of the recording layer (16) of the optical disk, indicated by the indicating means (20), include the laserbeam reflection factor of the layer, the polarity of the information signals recorded on the layer, or the threshold power value of the power source of laser beams applied to the layer.

7. The information-storage medium according to claim 1, characterized in that said information-storage medium (14) is housed in a cassette (12) for protection, and said indicating means (20) is provided on the cassette.

8. The information-storage medium according to claim 7, characterized in that said indicating means (20) includes a magnetic tape (28) on which magnetic signals indicating the properties of the recording layer (16) are recorded.

9. The information-storage medium according to claim 7, characterized in that said indicating means (20) includes a bar code (26) indicating the properties of the recording layer (16).

10. The information-storage medium according to claim 7, characterized in that said indicating means (20) includes signs (30) indicating the properties of the recording layer (16).

11. The information-storage medium according to claim 7, characterized in that said indicating means (20) includes a combination of depressions (32) and projections (34) indicating the properties of the recording layer (16).

12. The information-storage medium according to claim 7, characterized in that a laser beam is used for said information reproduction, and said properties of the recording layer (16) of the optical disk, indicated by the indicating means (20), include the laserbeam reflection factor of the layer, the polarity of the information signals recorded on the layer, or the threshold power value of the power source of laser beams applied to the layer.

13. An information-processing apparatus (10) for reproducing information of an optical information storage medium (14) having a recording layer (16),

characterized by comprising:

means (20), provided on the optical information

storage medium (14), for indicating the property of the recording layer (16);

means (22) for reading the property of the recording layer (16) from said indicating means (14);

means (18) for reproducing the information recorded on the recording layer (16); and

means (24) for controlling the operation of said reproducing means (18) in accordance with the property of the recording layer (16) read by said reading means (22), so that the operation for the reproduction of the information changes in response to the property of the recording layer (16) indicated by said indicating means (20).

14. The information-processing apparatus according to claim 13, characterized in that said indicating means (20) includes a magnetic tape (28) on which magnetic signals indicating the properties of the recording layer (16) are recorded.

15. The information-processing apparatus according to claim 13, characterized in that said indicating means (20) includes a bar code (26) indicating the properties of the recording layer (16).

16. The information-processing apparatus according to claim 13, characterized in that said indicating means (20) includes signs (30) indicating the properties of the recording layer (16).

5 17. The information-processing apparatus according to claim 13, characterized in that said indicating means (20) includes a combination of depressions (32) and projections (34) indicating the properties of the recording layer (16).

10 18. The information-processing apparatus according to claim 13, characterized in that a laser beam is used for said information reproduction, and said properties of the recording layer (16) of the optical disk, indicated by the indicating means (20), include the laserbeam reflection factor of the layer, the polarity of the information signals recorded on the layer, or the threshold power value of the power source of laser beams applied to the layer.

15 19. The information-processing apparatus according to claim 13, characterized in that said information-storage medium (14) is housed in a cassette (12) for protection, and said indicating means (20) is provided on the cassette.

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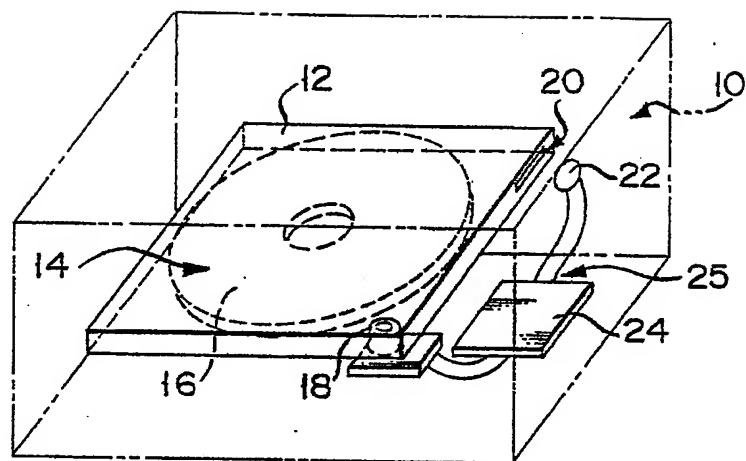
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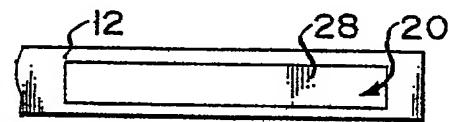
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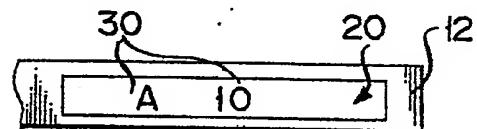
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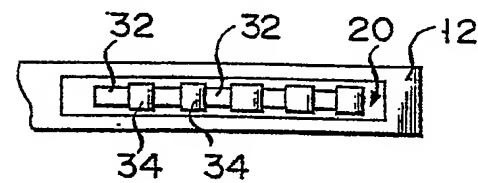
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F I G. 4

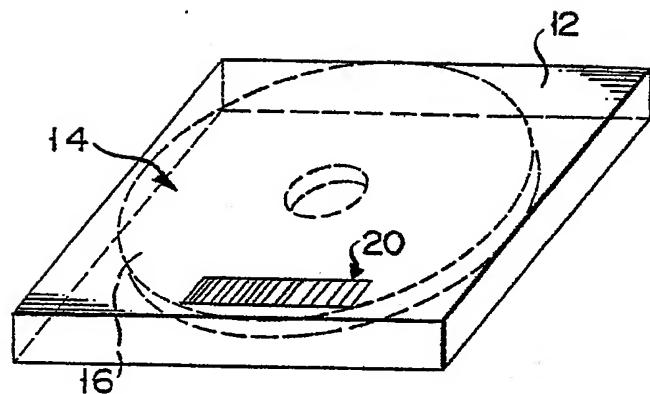


F I G. 5



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F I G. 6



F I G. 7

